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Status report on research project on improving design of a hopper dredge pump, November 1960

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FRITZ ENGINEERING LABORATORY

HYDRAULICS DIVISION

Memorandum No. M-19

F.L. Report No. 277-M-19

STATUS REPORT ON RESEARCH PROJECT

ON

IMPROVING DESIGN OF A HOPPER DREDGE PUMP

Prepared by

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Prepared for

U.S. ARMY ENGINEER DISTRICT, PHILADELPHIA

Corps of Engineers

Philadelphia 29, Pennsylvania

Contract No. DA-36-109-CIVENG-59-112

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Bethlehem, Pennsylvania

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I. INTRODUCTION

The following report summarizes the studies performed during the month of October 1960, at the Hydraulics Division of Fritz Engineering Laboratory, under terms of Contract No. DA-36-109-CIVENG-59-112. Earlier work was described in status reports dated: December 1958(1)*, February 1959(2), April 1959(3), June 1959(4), December 1959(6), March 1960(9), April 1960(10), May 1960(11), June 1960(12), July 1960(13), August 1960(15), September 1960(16), and a project report dated September 1959(5).

II. EXPERIMENTAL STUDIES

A. General Comments

No experimental tests were carried out during this period as the volute casing is being repaired. The latest word from the manufacturer is that the shipment will be made about December 16, 1960.

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* Numbers in parentheses indicate REFERENCES

B. Characteristic Curves

Additional characteristic curves for the pump with impellers No. TD-5 and TD-6 have been prepared and are presented in the Appendix.

Figures A-1 to A-6 present the characteristic curves for silt-clay-water mixture concentration of 1240 grams per liter. The curves were plotted for two impellers, TD-5 and TD-6, on the same graphs for comparison reasons. The following pump speeds are presented:

Figure	Speed (rpm)
A-1	1150
A-2	1300
A-3	1440
A-4	1550
A-5	1650
A-6	1750

Additional characteristic curves are being prepared for two silt-clay-water mixture concentrations: 1170 and 1320 grams per liter.

III. ADDITIONAL STUDIES

It was indicated in Memorandum No. M-15(16) that it would be valuable to test additional impellers to isolate effects of vane shape and vane exit angle on pump characteristics.

Cost estimates for extending the phases B and C of the present study have been prepared and submitted to the sponsor separately.

R E F E R E N C E S

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(2) Herbich, J. B. STATUS REPORT OF RESEARCH PROJECT ON IMPROVING DESIGN OF A HOPPER DREDGE PUMP. Fritz Engineering Laboratory Memorandum No. M-2 Lehigh University, February 1959

(3) Herbich, J. B. STATUS REPORT OF RESEARCH PROJECT ON IMPROVING DESIGN OF A HOPPER DREDGE PUMP. Fritz Engineering Laboratory Memorandum No. M-3 Lehigh University, April 1959

(4) Herbich, J. B. STATUS REPORT OF RESEARCH PROJECT ON IMPROVING DESIGN OF A HOPPER DREDGE PUMP. Fritz Engineering Laboratory Memorandum No. M-4 Lehigh University, June 1959

(5) Herbich, J. B. CHARACTERISTICS OF A MODEL DREDGE PUMP Fritz Engineering Laboratory Project Report No. 31 Lehigh University, September 1959

(6) Herbich, J. B. STATUS REPORT OF RESEARCH PROJECT ON IMPROVING DESIGN OF A HOPPER DREDGE PUMP. Fritz Engineering Laboratory Memorandum No. M-5 Lehigh University, December 1959

(7) Herbich, J. B. Weiss, W. L. Waddington, W. STATUS REPORT OF RESEARCH PROJECT ON IMPROVING DESIGN OF A HOPPER DREDGE PUMP. Fritz Engineering Laboratory Memorandum No. M-6 Lehigh University, February 1960

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(8) Weiss, W. L. — SUGGESTED DESIGN CHANGES FOR A CENTRIFUGAL PUMP IMPELLER HANDLING DREDGED MUD
Fritz Engineering Laboratory Special Report
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ASME Paper No. 59-Hyd-10,
Journal of Basic Engineering, 1959

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(15) Herbich, J.B. STATUS REPORT OF RESEARCH PROJECT ON IMPROVING DESIGN OF A HOPPER DREDGE PUMP. Fritz Engineering Laboratory Memorandum No. M-14 Lehigh University, August 1960

(16) Herbich, J.B. STATUS REPORT OF RESEARCH PROJECT ON IMPROVING DESIGN OF A HOPPER DREDGE PUMP. Fritz Engineering Laboratory Memorandum No. M-15 Lehigh University, September 1960

(17) Herbich, J.B. STATUS REPORT OF RESEARCH PROJECT ON IMPROVING DESIGN OF A HOPPER DREDGE PUMP. Fritz Engineering Laboratory Memorandum No. M-17 Lehigh University, October 1960

A P P E N D I X

Fig. A-1 to A-6

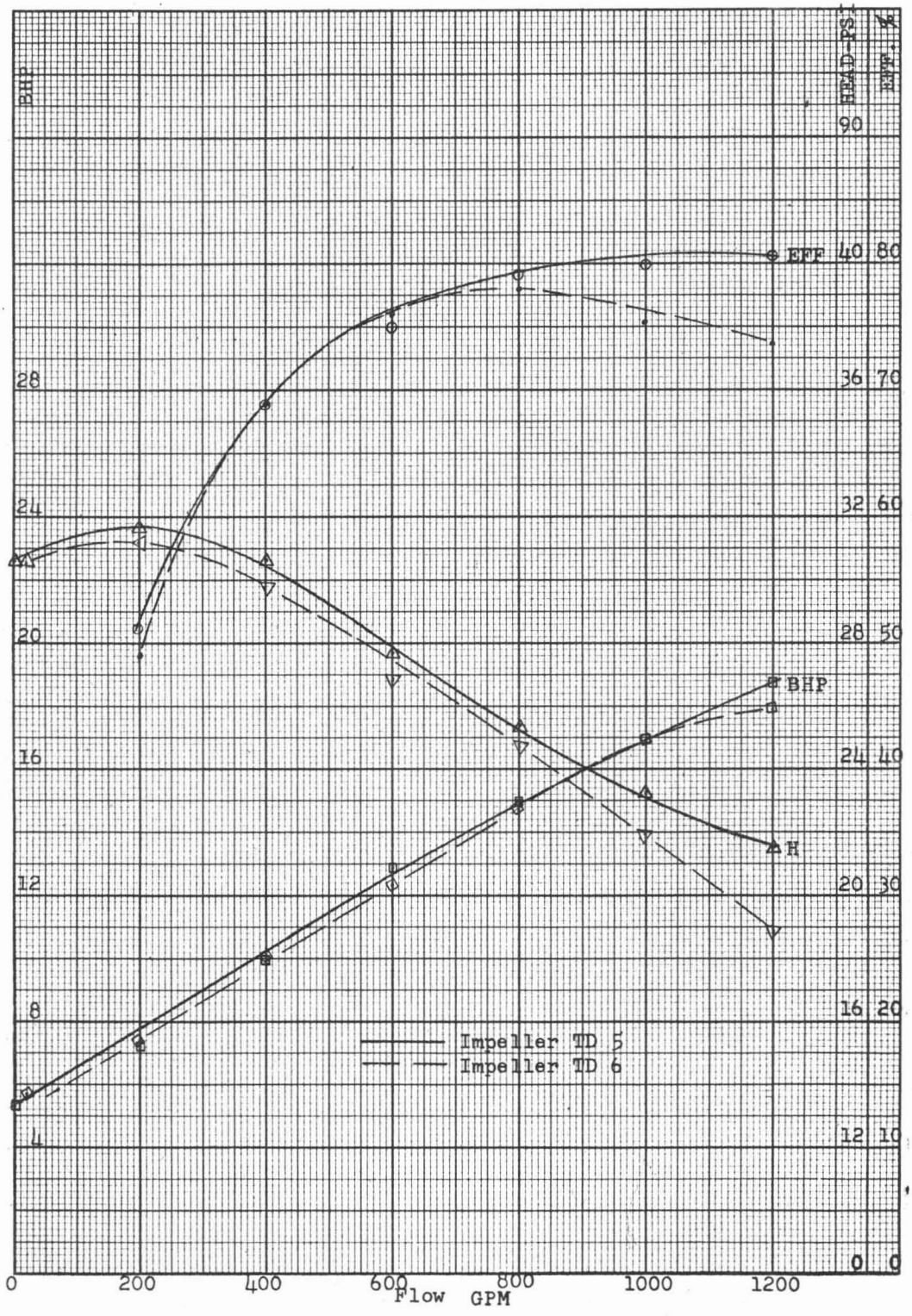

Fig. A-1 - MODEL DREDGE PUMP CHARACTERISTICS
Concentration: 1240 grams/liter
Speed: 1150 rpm

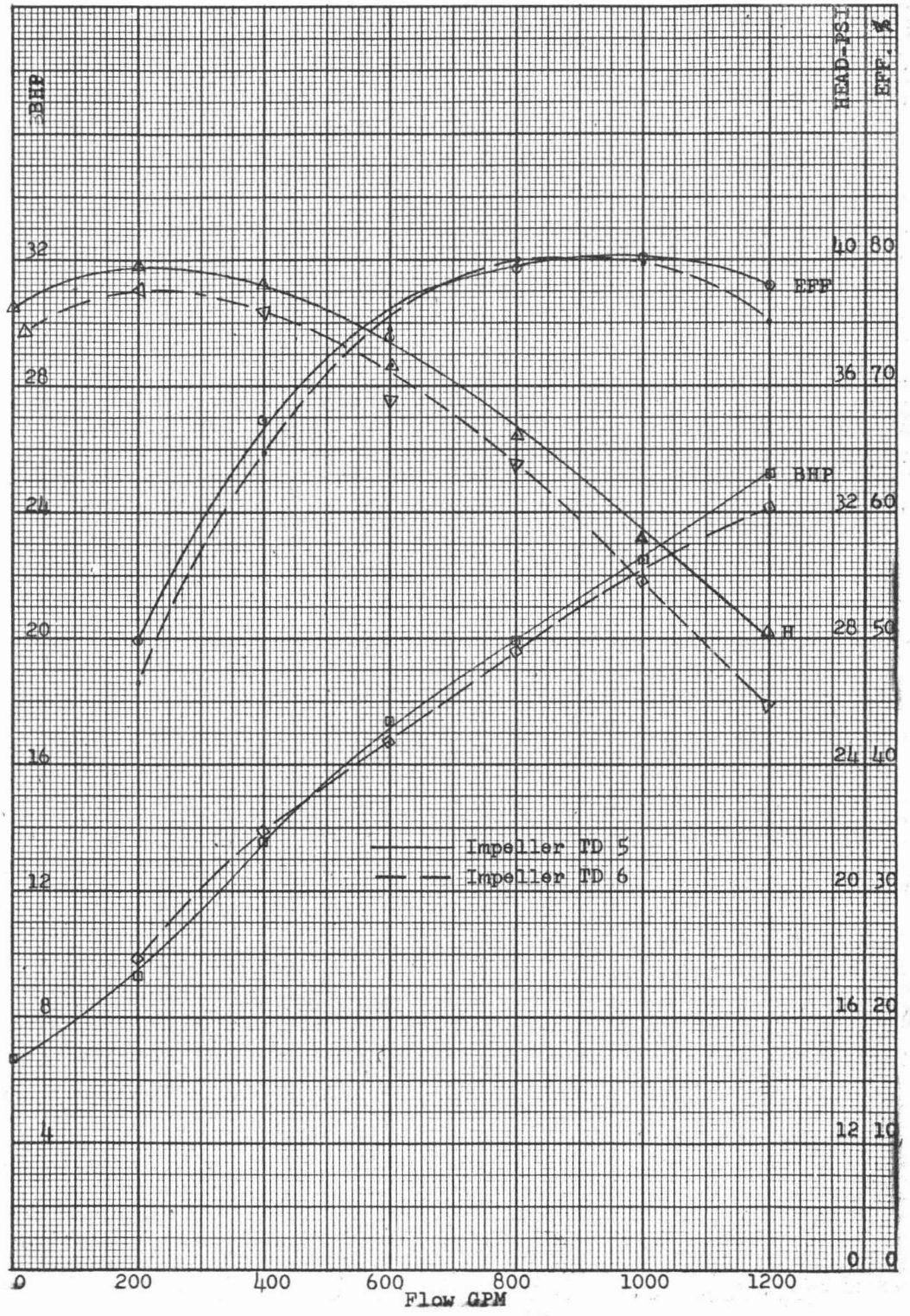

Fig. A-2 - MODEL DREDGE PUMP CHARACTERISTICS
Concentration: 1240 grams/liter
Speed: 1300 rpm

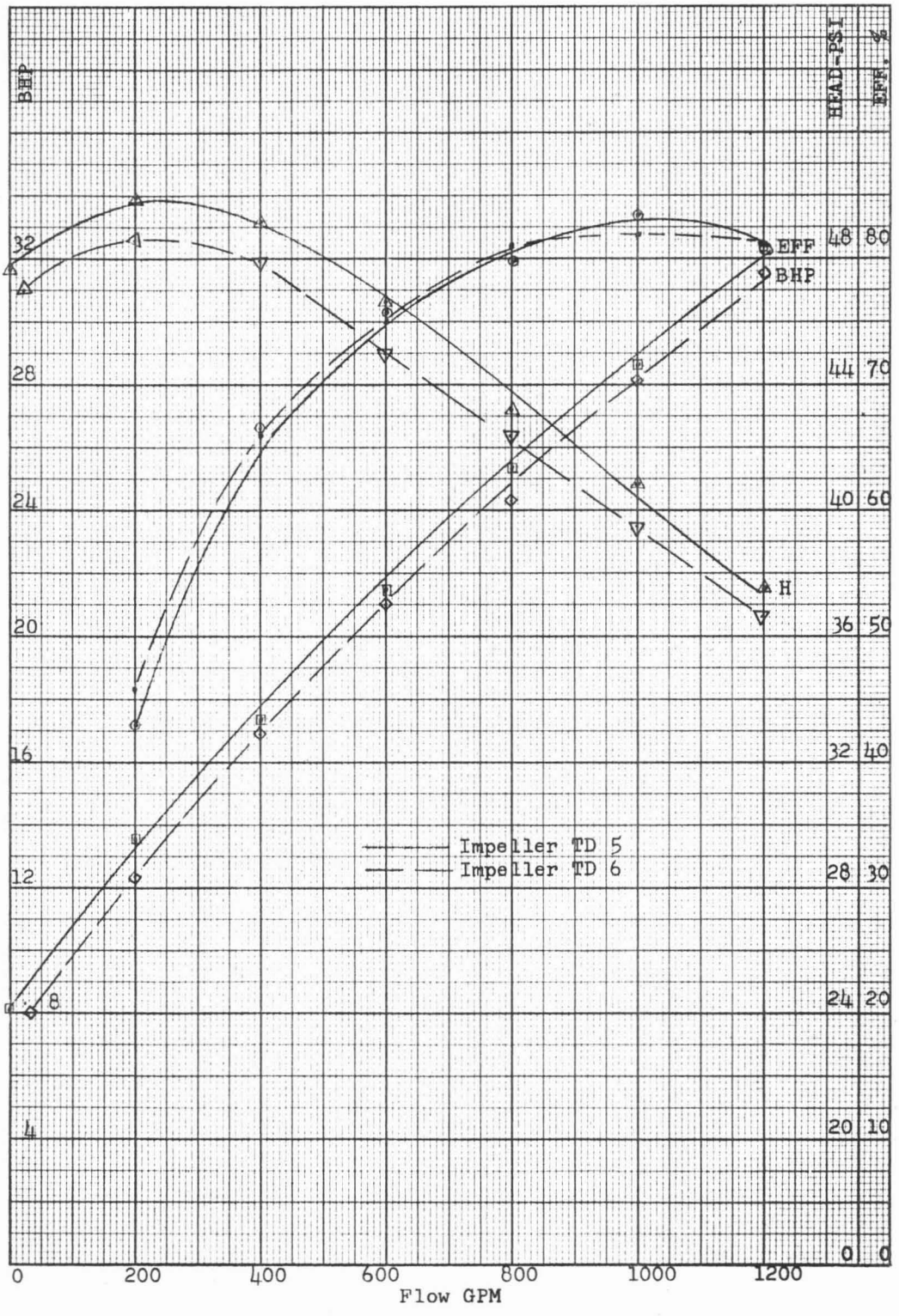

Fig. A-3 - MODEL DREDGE PUMP CHARACTERISTICS
Concentration: 1240 grams/liter
Speed: 1440 rpm

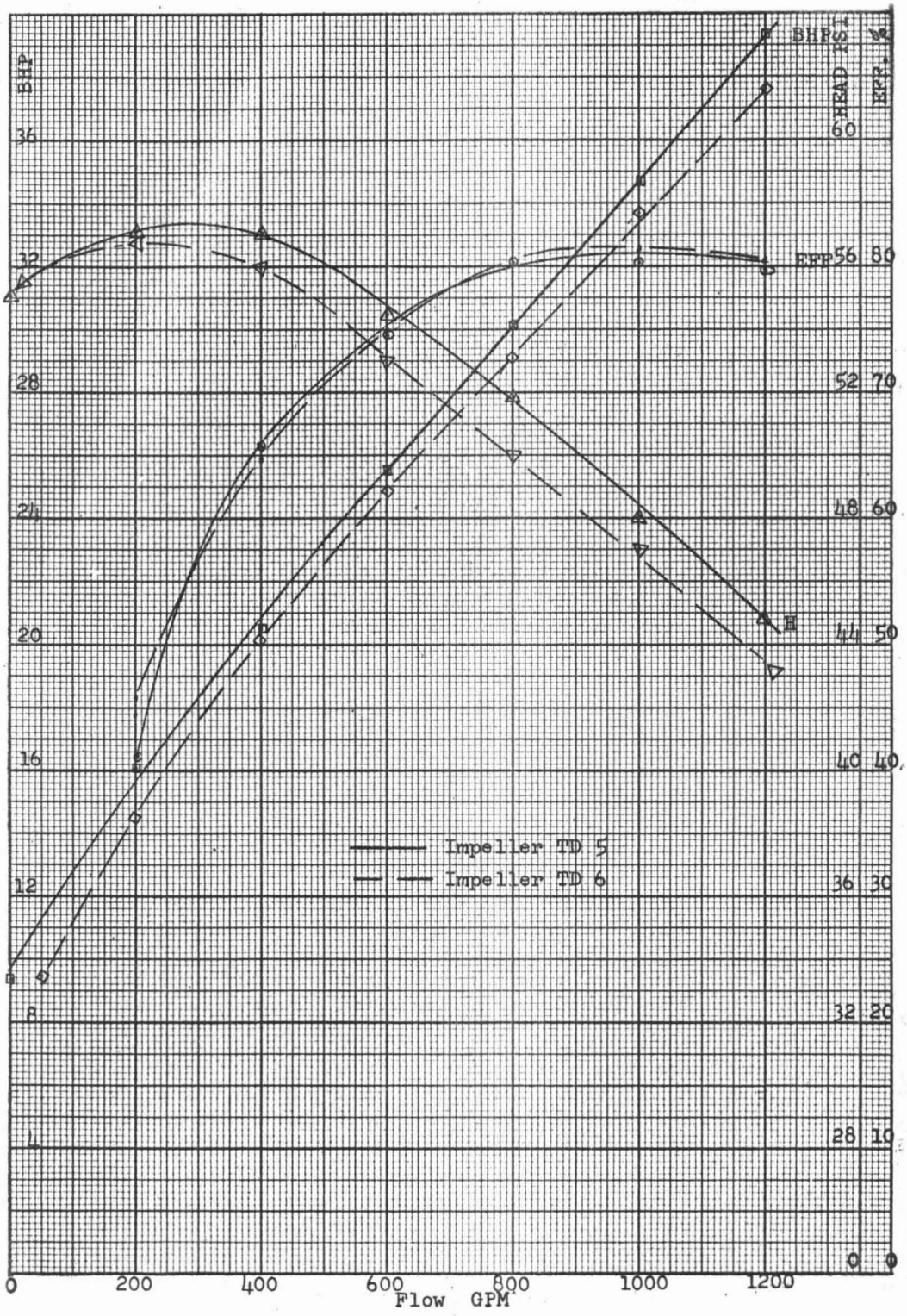

Fig. A-4 - MODEL DREDGE PUMP CHARACTERISTICS
Concentration: 1240 grams/liter
Speed: 1550 rpm

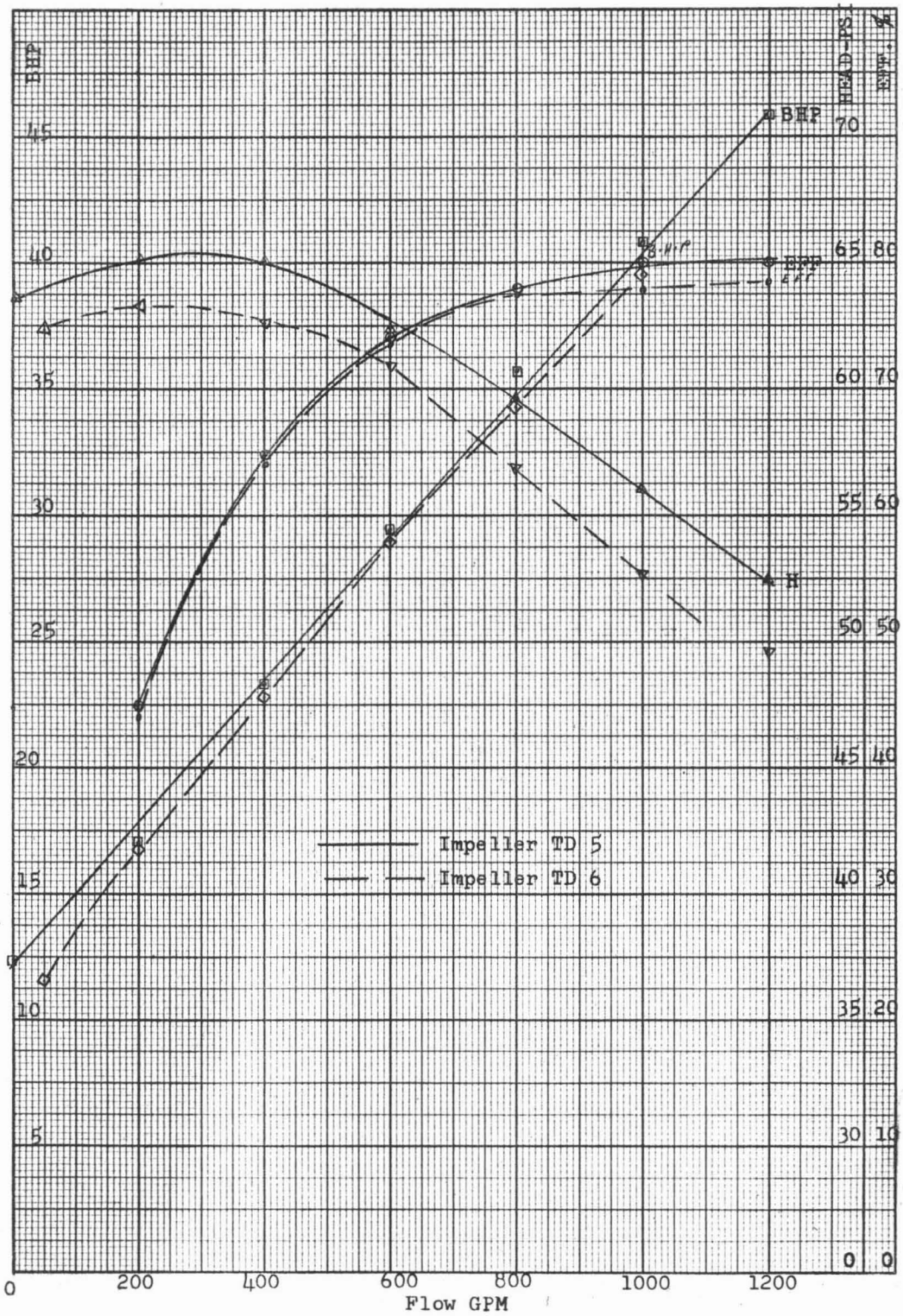

Fig. A-5 - MODEL DREDGE PUMP CHARACTERISTICS
Concentration: 1240 grams/liter
Speed: 1650 rpm

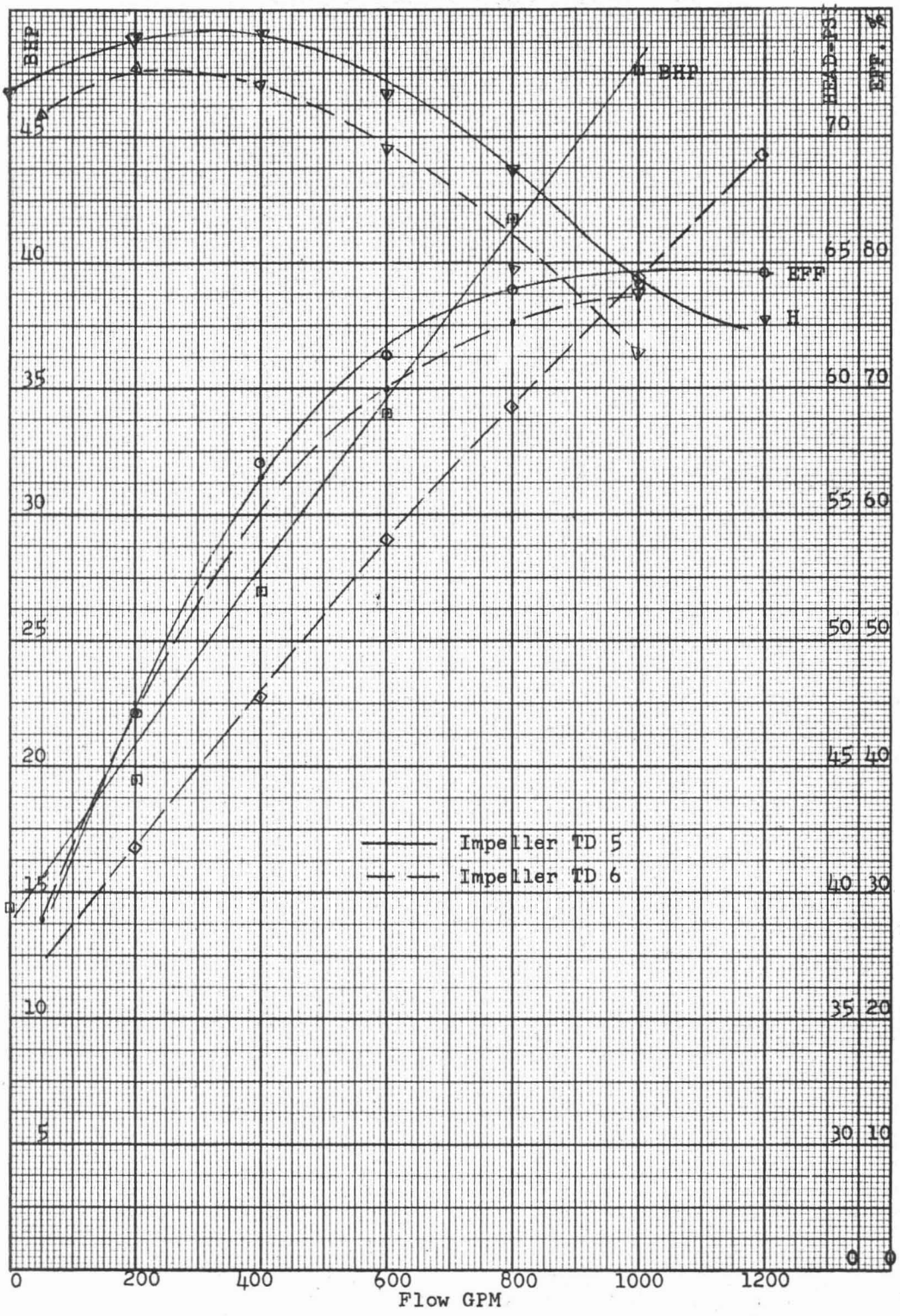

Fig. A-6 - MODEL DREDGE PUMP CHARACTERISTICS
Concentration: 1240 grams/liter
Speed: 1750 rpm